REMARKS

Reconsideration and allowance are respectfully requested.

Claims 1, 4-12 and 21-35 are pending in this application.

Claims 1-4, 12 and 21-35 are rejected under 35 USC § 112, second paragraph.

The originally filed specification at the paragraph bridging pages 3-4 states (emphasis added):

> The use of a laser source for fusing the braze enables the heat or energy input to be controlled very precisely. Since the energy of the laser beam, the shape of the laser beam and its position, for example, can be set and controlled with high accuracy, the braze can be melted in a highly controlled manner. The joining process in accordance with the present invention can, therefore, be executed without, or with very low, heat input into the components to be joined. This is advantageous in that the structure of the components is not affected in an undesired manner. Furthermore, dimensional deviations of the components by heat expansion are precluded since virtually no thermal elongation or shrinkage occurs.

Thus, also taken with the text cited from the specification by the Examiner (at paragraph [0026]), there is sufficient support for the claim 1 requirement of "limiting heating of the TiAl components to an amount insufficient to 1) change a structure of the components; and 2) substantively change dimensions of the components due to thermal expansion". If there is something else that the Examiner believes is unsupported in the specification, it is respectfully requested that the Examiner specifically detail what that is.

Claims 1, 4-12 and 21-35 stand r ejected under 35 USC 103(a) as being unpatentable over Churchill in view of Metals Handbook in view of Clement in view of AAPA

Claim 1 has been amended to require:

1. (Currently Amended) A method for the joining of TiAl components with a braze having a melting temperature lower than a melting temperature of the TiAl components, comprising:

aligning the TiAl components to form a braze joint therebetween into which molten braze can be deposited;

depositing the braze into the braze joint;

directly heating only ~~heating~~ the braze with a laser beam to a temperature at which the braze is molten but which temperature is below a melting temperature of the TiAl components, so that the braze adheres to the TiAl components;

preventing primary heat input into the TiAl components and limiting heating of the TiAl components to an amount insufficient to 1) change a structure of the components; and 2) substantively change dimensions of the components due to thermal expansion.

Support for such amendments can be found in the specification at page 6, lines 16-28 (emphasis added):

> Fig. 2 shows an embodiment in which the components 1, 2 are butt joined by means of the braze 3. A laser 4 is shown schematically. Also shown is the input of protective gas 5 into the area heated by the laser 4. As becomes apparent from the figure, virtually no heat is input into the edge zone 7 of the components 1, 2. Only the braze 3 must be melted to adhere to the components 1 and 2; the components 1 and 2 need not be heated for the brazing process, and even if heated, the heating is minor and not sufficient to melt the components as would be required in a welding process, or even sufficient to change the structure of the components 1 and 2 or substantively change the dimensions of the components due to thermal expansion. The ductile braze 3 selected can deform when subjected to stresses during the joining process, as illustrated by the convex surface areas. For wide joining gaps, the molten braze 3 is protected from sagging by means of a backing 8 in the form of a bar or plate on the back of the seam.

Support for such amendment can also be found in original claim 2 (emphasis added):

> 2. A method in accordance with Claim 1, wherein there is no primary heat input into the components.

Churchill teaches a laser brazing process. However, Churchill does not teach, suggest or otherwise render obvious the method of claim 1 requiring, inter alia (emphasis added):

> directly heating only the braze with a laser beam to a temperature at which the braze is molten but which temperature is below a melting temperature of the TiAl components, so that the braze adheres to the TiAl components;
>
> preventing primary heat input into the TiAl components and limiting heating of the TiAl components to an amount insufficient to 1) change a structure of the components; and 2) substantively change dimensions of the components due to thermal expansion.

Rather, Churchill specifically teaches 1) preheating the components (col. 10, lines 28-29 and directing the laser energy into the component opposite the side of the joint (col. 10, line 66 through col. 11, line 6). See Fig. 14a.

None of the Metals Handbook, Clement or the AAPA, alone or in combination, cures the deficiencies of Churchill.

The Examiner cites to the Metals Handbook as teaching "the main advantage laser brazing offers ... is its ability to produce a brazed connection locally without heating the entire part or component to the flow point of the brazing filler metal..." (emphasis added) and "another advantage is the high degree of control of the thermal energy of laser beams, including intensity, spot size, duration and ability to be located or positioned precisely".

While the Metals Handbook may teach that the entire part need not be heated to the flow point of the brazing filler metal and that laser brazing offers a high degree of control, nothing in the Metals Handbook excerpt teaches or suggests the above-noted requirements of claim 1 of "directly heating only the braze with a laser beam ... and preventing primary heat input into the TiAl components ... " Rather, the Metals Handbook specifically teaches heating of the base metal at the joint (last sentence of section entitled "Laser Brazing Process", on page 2).

The Examiner cites to Clement as teaching "the known process of laser joining, with or without filler material, of titanium aluminides." Clement fails to cure the deficiencies of Churchill and specifically teaches "heating the assembly obtained in step (c) [the articles to be joined and the brazing paste] in a vacuum furnace at a temperature between 1000° C and 1300°." See col. 2, lines 1-22.

Finally, the Examiner cites to the AAPA for teaching a variety of known joining processes. However, nothing in the AAPA has been shown to teach or suggest the above-noted requirements of claim 1 of, inter alia, "directly heating only the braze with a laser beam ... and preventing primary heat input into the TiAl components..." and therefore, the AAPA also fails to cure the deficiencies of Churchill.

In view of the above, the cited references, even in combination, fail to teach, suggest or otherwise render obvious amended claim 1 and it is respectfully requested that the 103 rejections of claim 1 be withdrawn.

Since all of the dependent claims depend from claim 1, they are believed allowable for the same reasons as claim 1, as well as for the further limitations

contained therein, and it is respectfully requested that the rejections of these dependent claims be withdrawn as well.

In view of the above, it is believed that the application is in condition for allowance and such a Notice is respectfully requested. If anything else is needed to place the application in condition for allowance, it is kindly requested that the undersigned be contacted.

Respectfully submitted,

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